

Energy Efficiency & Renewable Energy Overview

*Energy Codes 2009
Portland Oregon*

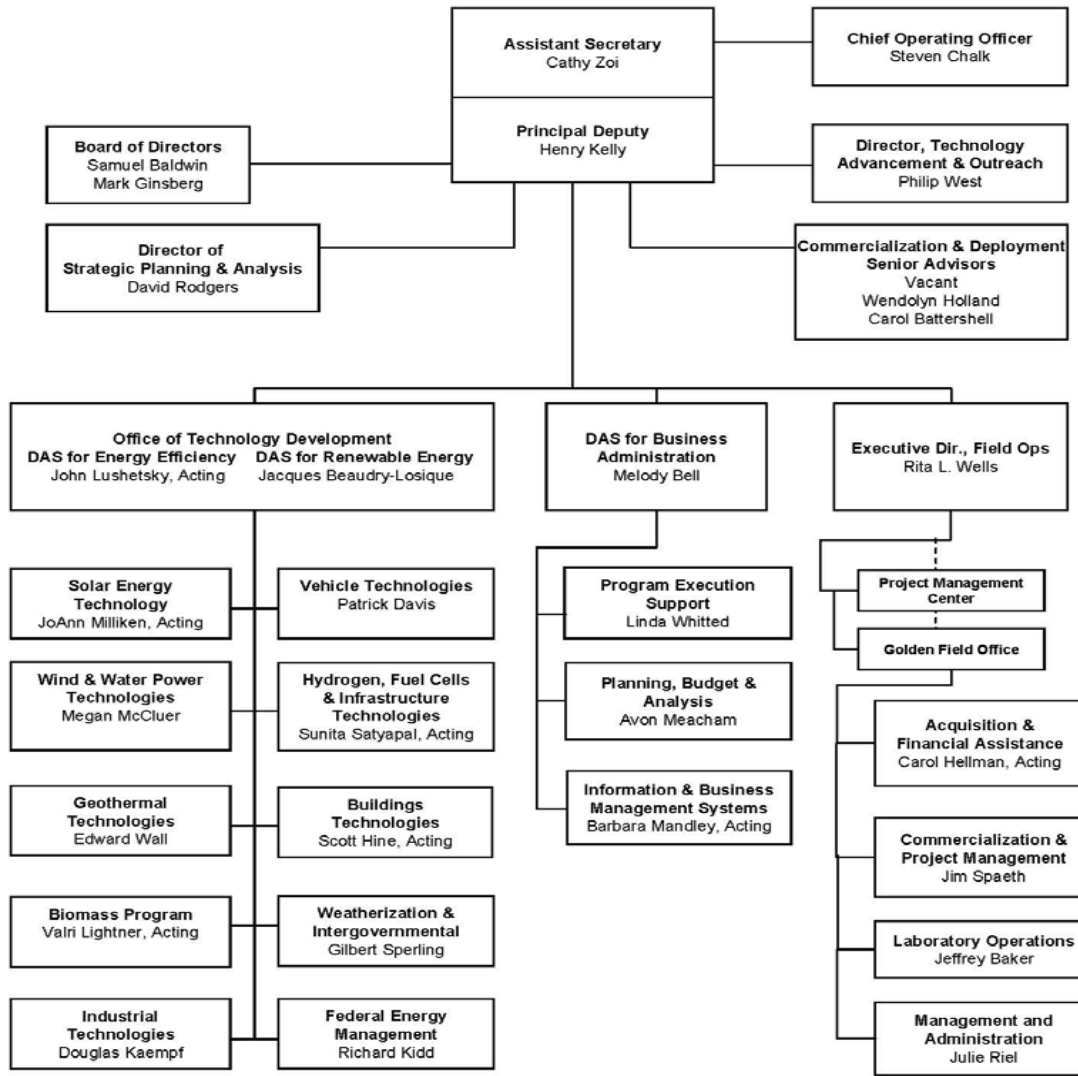
Scott E. Hine
Acting Program Manager
Building Technologies Program
July 27, 2009

Energy Efficiency and Renewable Energy

Organizational Chart

U.S. DEPARTMENT OF
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Energy Efficiency &
Renewable Energy

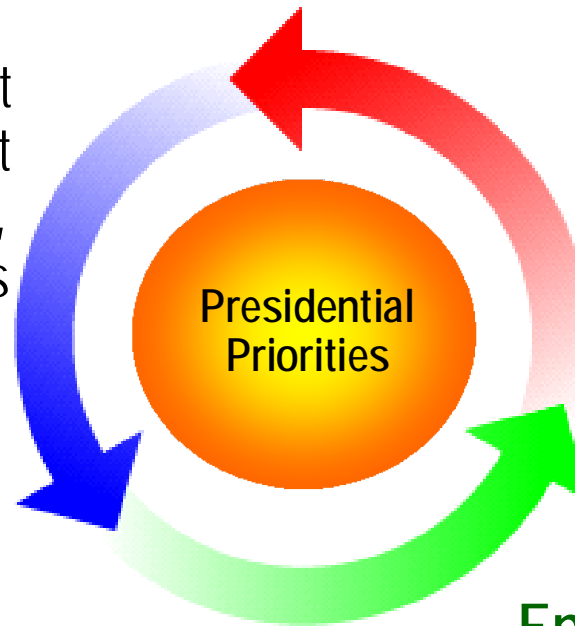


EERE's Role in Advancing Presidential Priorities

Energy efficiency and renewable energy research, development, and deployment activities help the Nation meet its **economic**, **energy security**, and **environmental** challenges concurrently.

Energy Security

- One million plug-in hybrid cars on the road by 2015
- Create a \$7,000 tax credit for advanced vehicles
- Establish a national low carbon fuel standard
- Increase fuel economy standards
- 60 billion gallons of advanced biofuels



Economic

- Ensure 10 percent of our electricity comes from renewable sources by 2012, and 25 percent by 2025
- Deploy the cheapest, cleanest, fastest energy source – energy efficiency
- Weatherize one million homes annually

Environmental

- Implement an economy-wide cap-and-trade program to reduce greenhouse gas emissions 80 percent by 2050
- Make the US a leader on climate change

Office of Energy Efficiency and Renewable Energy Technology Portfolio

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Electric Power Generation

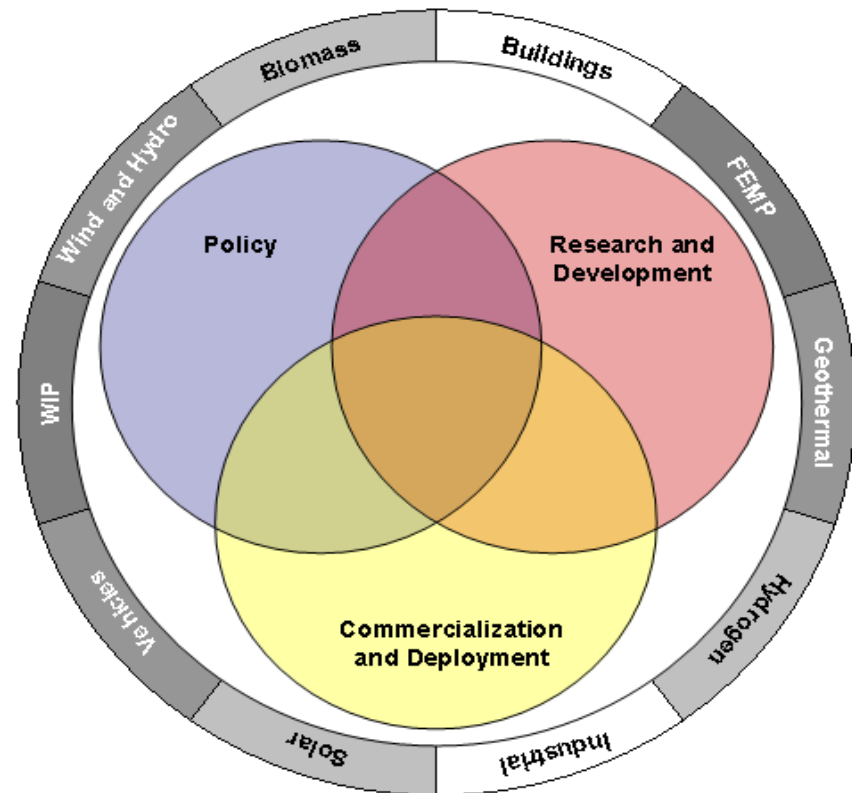
- Geothermal
- Solar
- Wind
- Hydropower & Advanced Water Power

Advanced Transportation

- Biomass
- Fuel Cells
- Advanced Vehicles

Energy Efficiency

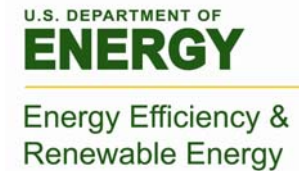
- Buildings
- Industrial
- Federal Energy Management
- Weatherization and Intergovernmental



Mission Statement

To develop cost competitive technology, facilitate commercialization and deployment to the marketplace

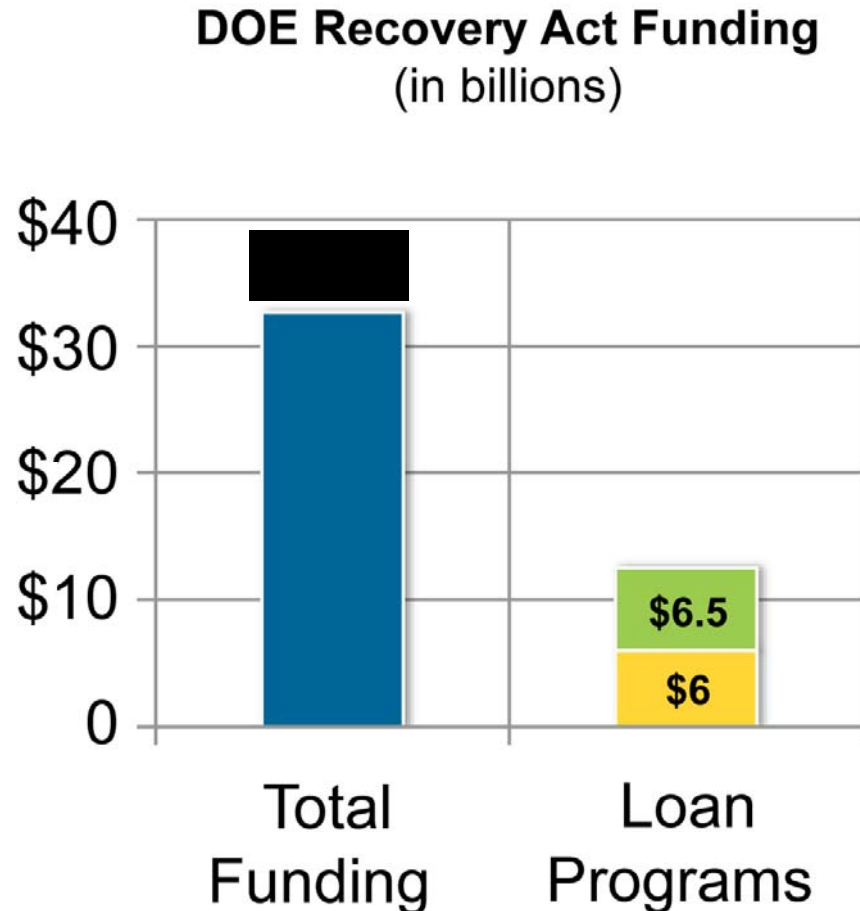
DOE Recovery Act Funding



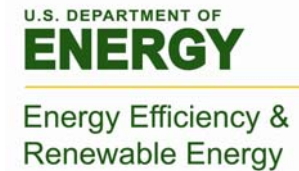
Total: \$32.7B
(excluding loan programs)

Loan programs: \$12.5B

- Rapid deployment of renewable energy systems: \$6B
- DOE power administration borrowing authority: \$6.5B

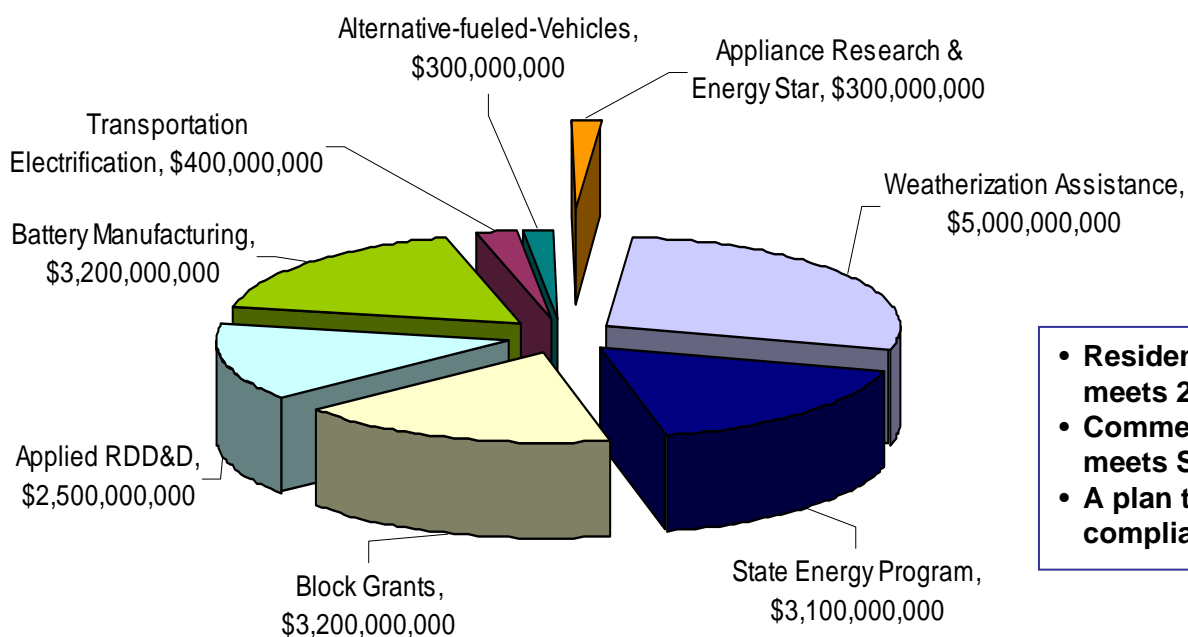


Energy Efficiency and Renewable Energy (EERE) Recovery Act Funding



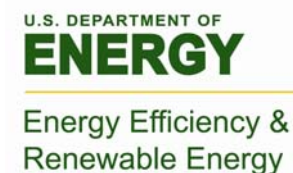
EERE RD&D			\$2.5B
	Biomass	\$800M	
	Geothermal	\$400M	
	Information & Communications Tech.	\$50M	
	EERE Discretionary Funding	\$1.25B	
Energy Efficiency Conservation Block Grants			\$3.2B
State Energy Program			\$3.1B
Weatherization Assistance			\$5.0B
Energy Efficient Appliance and ENERGY STAR Rebates			\$300M
Alternative Fuel Vehicle Grant Program			\$300M
Advanced Battery Manufacturing Grants			\$2.0B

EERE Recovery Act Funding Allocation



- Residential energy code meets 2009 IECC
- Commercial energy code meets Standard 90.1-2007,
- A plan to achieve 90 percent compliance in 8 yrs.

Recovery Act funds accelerate Building Technologies Program goals and expand building codes, appliance standards and ENERGY STAR efforts.



Project	Recovery Act Funding
<i>Advanced Building Technologies</i> <ul style="list-style-type: none"> Accelerates building technology RD&D through R&D projects, via national laboratory as well as with the private sector (crosscut competitive solicitation) to develop more efficient technologies contributing to 70% energy savings. 	\$100M
<i>Residential Buildings (Building America, Builders' Challenge, and Existing Home Retrofits)</i> <ul style="list-style-type: none"> Complete 15 energy efficient Municipal and Subdivision retrofit projects and 6 Deep Energy Savings retrofit projects. Builders Challenge: Achieve an additional 1.5% market share by September 2010 by working with 750 builder partners who build homes 30% more energy efficient than code. 	\$70M
<i>Commercial Buildings Initiative Acceleration</i> <ul style="list-style-type: none"> Partner with major companies that design, build or operate large fleets of buildings and that commit to exemplary energy performance in selected new and existing commercial buildings. 	\$53.5M
<i>Building and Appliance Market Transformation</i> <ul style="list-style-type: none"> Expands building codes adoption and assists states in the implementation of higher level codes. Increases the breadth and scope of ENERGY STAR with emerging technology develop a more robust certification and validation process. Accelerates the pace and scope of Appliance Standard test procedure development. Improve the efficiency of commercial buildings' operations by developing training curricula. 	\$72.5M
<i>Solid State Lighting</i> <ul style="list-style-type: none"> Accelerates technical goals to increase the efficacy of state-of-the-art SSL to 113 lm/W of white light from a laboratory LED module by FY10. 	\$50M
TOTAL	\$346M

Tracking Our Progress

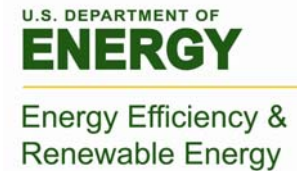
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- The American people want to know who is receiving the money, and they want to know they are getting value though the investment of their hard-earned tax dollars
- Everything we do will be transparent:
 - Posting weekly updates on the web site
 - Upgrading the web site and setting up a call center to handle the activity
- Visit recovery.gov or energy.gov/recovery/ to stay informed



How can State & local governments help stimulate the economy,

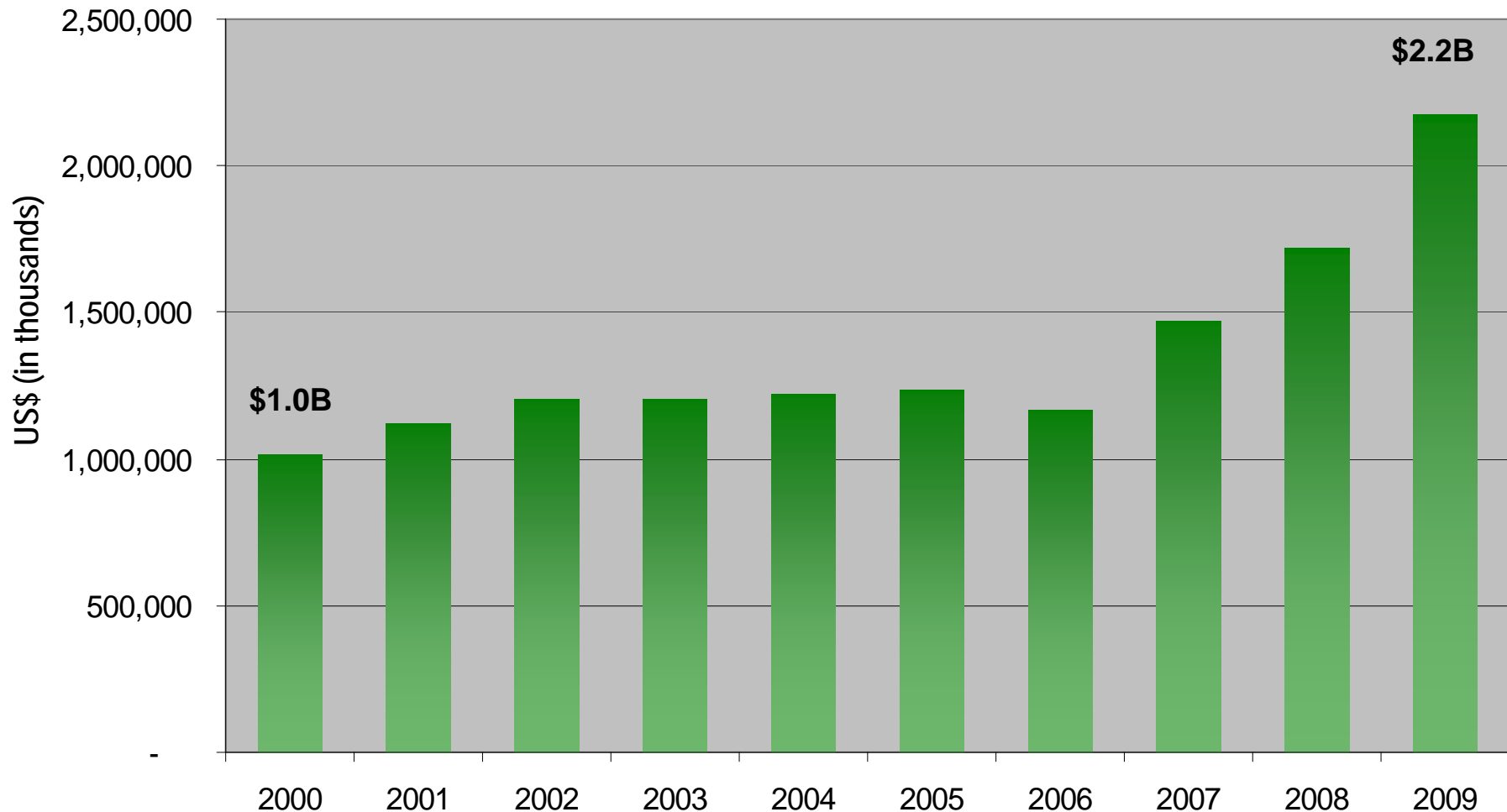


- Lead by example
 - Implement energy efficient technologies in public buildings and activities
- Incentivize efficiency
 - Help to reduce the initial costs of energy efficient technology adoption by the public
- Raise the bar
 - Adopt, implement and enforce building codes that increase energy efficiency, provide new and increased markets for energy efficient technologies, create new jobs

Energy Efficiency and Renewable Energy Budget History (FY 2000-2009)

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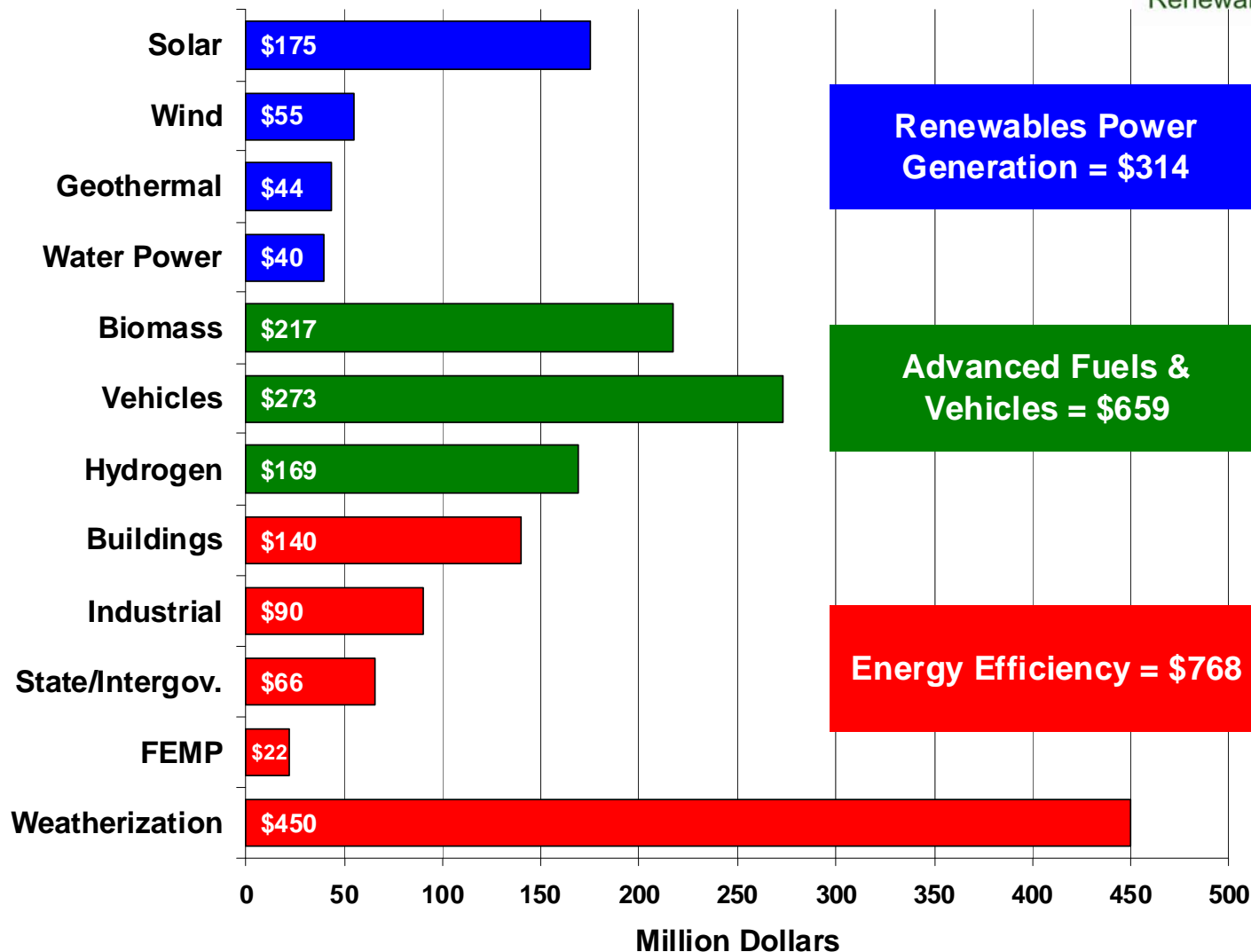


In addition to FY09 funding, EERE received \$16.8 billion in funding through the American Recovery and Reinvestment Act of 2009

EERE Fiscal Year 2009 Budget - \$2,179 Million

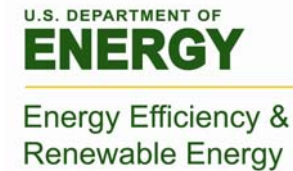
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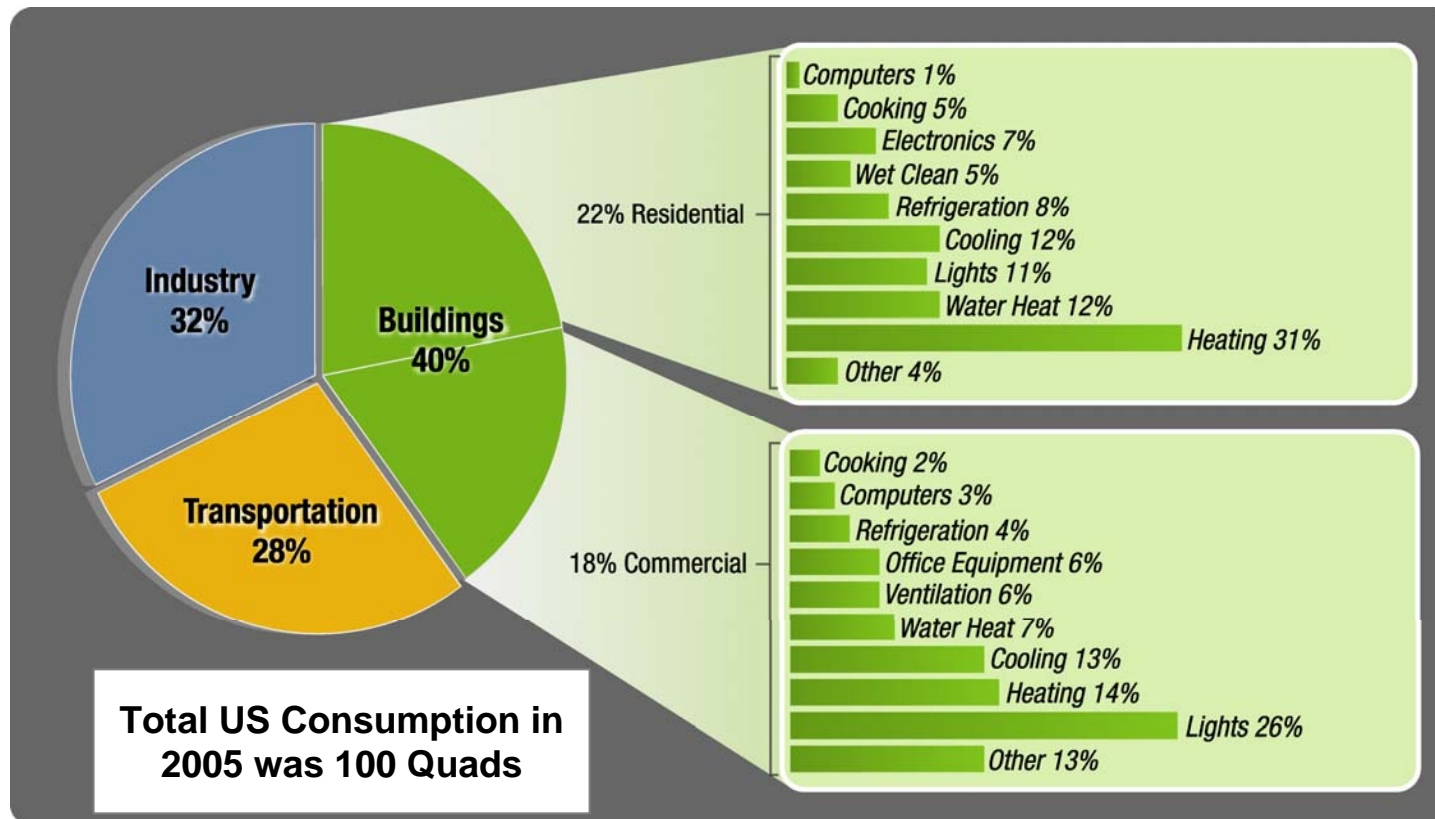
Note: Bar chart does not include Facilities and Infrastructure (\$76), Program Direction (\$128), Program Support (\$18) and Congressionally Directed (\$229)

EERE's Strategic Program Directions



Program Priorities	
Biomass	Investing over \$1.4 billion to achieve cost competitiveness and commercialization of cellulosic and other advanced biomass feedstocks and biofuels through applied research, next generation pilot scale development, commercial scale biorefinery demonstrations and targeted infrastructure activities.
Buildings	Implementing a systems approach in deploying technologies for “net-zero” energy buildings that produce as much energy as they consume. Builder’s Challenge, the Commercial Buildings Initiative, and accelerated building codes and appliance standards implement this new approach.
FEMP	Doubled energy efficiency investment in Federal building through \$1 billion of private-party performance contracting. New ESPC contracts will support up to \$80 billion in energy savings at federal facilities and increase individual contract ceilings to \$5 billion over the life of the contract.
Geothermal	Program renaissance emerged on foundation of Enhanced Geothermal Systems (EGS) that allows geothermal energy to be harnessed nationwide providing up to 10% of our Nation’s future electricity.
Fuel Cells	Added focus on near-term stationary and early market applications to create economies of scale, accelerate learning-by-doing, and reduce cost of technology for transportation market.
Industrial	Concentrating on the Save Energy Now program, which through energy assessments has resulted in savings of over \$100 million and 75 trillion Btus of natural gas.
Solar	Achieve grid parity with PV and other solar technologies by 2015 through advanced R&D over the entire supply chain. Re-invigorate Concentrated Solar Power program through launch of energy storage research and demonstration.
Vehicles	Focusing on fuel flexible Plug-in Hybrid Electric Vehicles through greatly enhanced battery research activities and new utility partnerships.
Weatherization/SEP	Developed stronger ties with States and utilities by providing technical assistance and by developing “best practices” and model policies for faster and larger scale adoption of efficiency and renewable energy.
Wind & Water Power	Assessed feasibility for wind energy to provide 20% of our Nation’s electricity which led to new industry vision. Launched new program in wave, tidal and current energy.

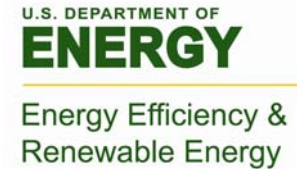
Buildings Sector accounts for about 40% of US Energy, 72% of Electricity, 34% of Natural Gas, 38% of Carbon, 18% of NO_x, and 55% of SO₂ Emissions.



Building Sector construction spending for 2009 is estimated to reach \$968B. Building Sector construction and renovation accounts for 9% of GDP and employs 8 million people. Building energy costs totaled \$390B in 2006.

BTP Mission, Vision and Goals

Creating technologies and design approaches that enable net-zero energy buildings at low incremental cost



Vision: Realization of marketable net-zero energy buildings through the development of conservation technologies and practices.



Mission: Develop technologies, techniques, and tools for making residential and commercial buildings more energy efficient, productive, and affordable.

Goal: Create technologies and design approaches that enable net-zero energy buildings at low incremental cost.

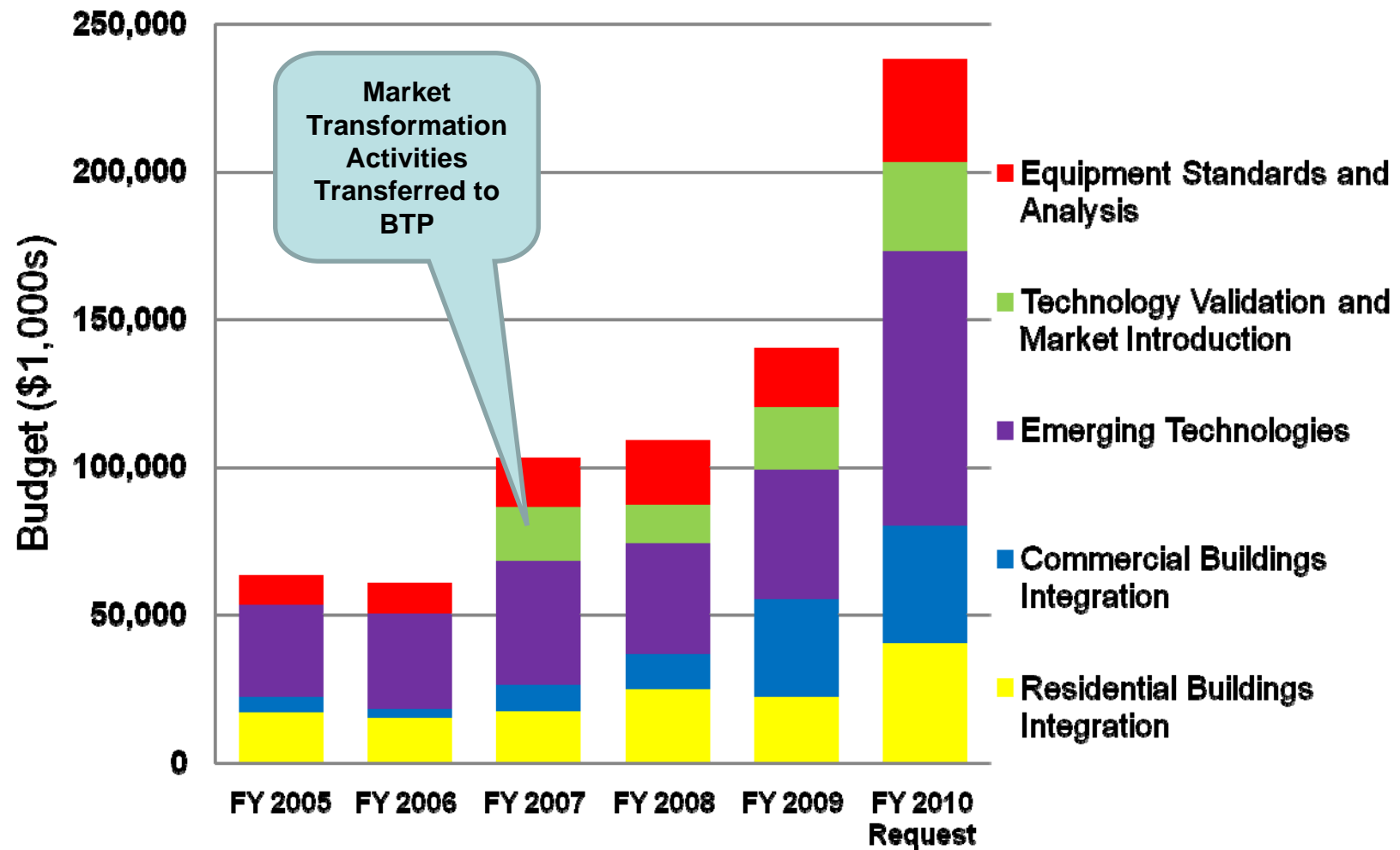


- Current goals:
 - By 2020 for Residential New Construction
 - By 2025 for Commercial New Construction
- Existing buildings require attention:
- 114 million households
 - 2/3 of homes were built before 1980, and modern residential energy codes did not take effect until 1980s
- Five million commercial buildings
 - More than 74 billion square feet of floor space



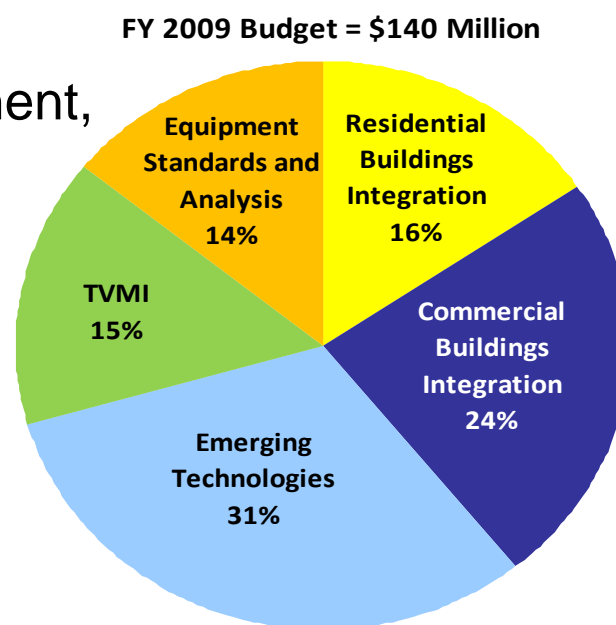
Definition: A net-zero energy building is one with greatly reduced needs for energy through efficiency (60 to 70% less energy use), with the balance of energy supplied by renewable energy sources.

Buildings Technologies (BTP) budget has grown over the past 5 years.



BTP employs three complementary strategies to achieve its mission.

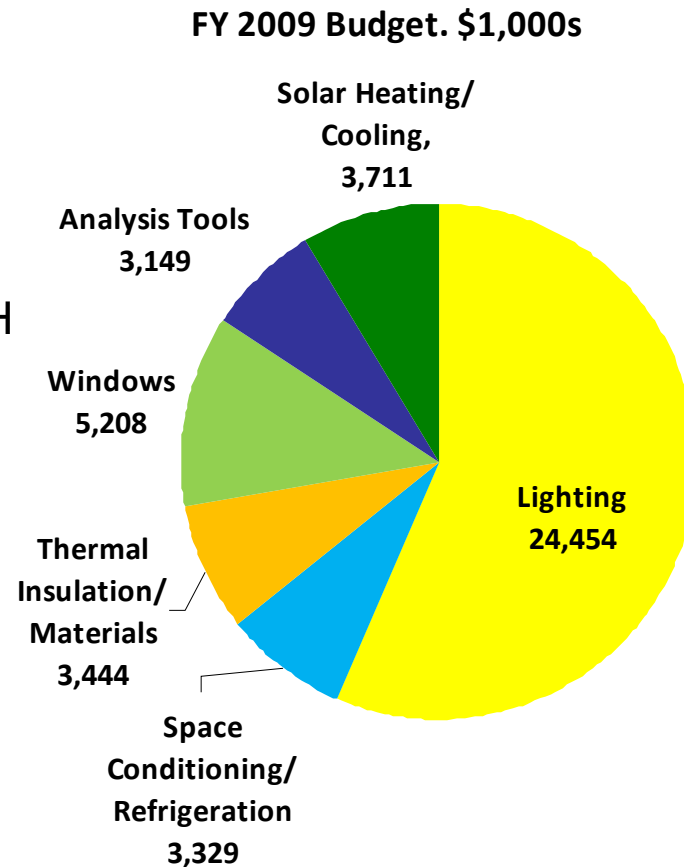
- R&D
 - Whole Building Integration (Residential and Commercial)
 - Emerging Technologies: Component, Equipment, and Materials
- Technology Validation and Market Introduction (TVMI)
 - ENERGY STAR
 - Building Energy Codes
 - Marketing Strategy
- Appliance Standards and Analysis



The goal is to create technologies and design approaches that enable net-zero energy buildings at low incremental costs.

Emerging Technologies fills the technical and cost gaps for net-zero energy buildings.

- Lighting R&D
 - Solid State Lighting
- Space Conditioning and Refrigeration R&D
 - Integrated appliances
 - Evaluate existing equipment for ZEH
 - New HVAC system concepts
 - Solar heating and cooling
- Building Envelope R&D
 - Dynamic Windows
 - Highly Insulated Windows
 - Next generation attic/roof systems
- Analysis Tools and Design Strategies
 - Energy Plus



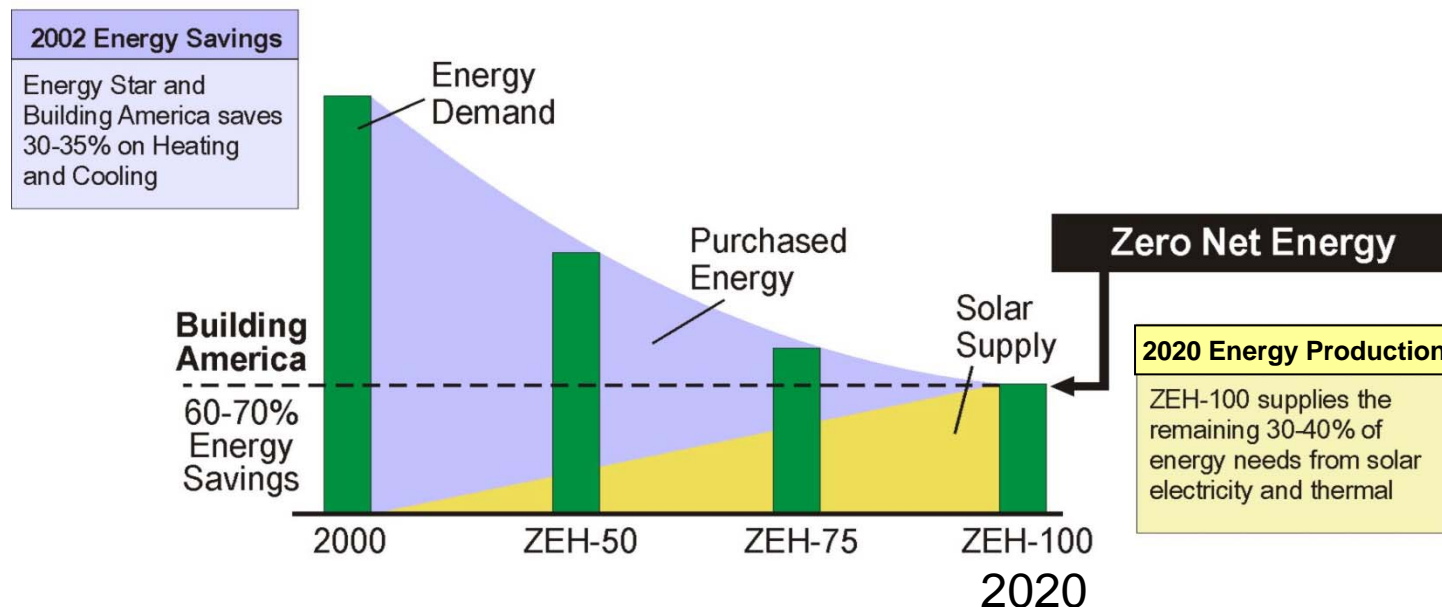
Residential Integration

The Building America program is marching toward Zero Energy Homes (ZEH) for all Americans.

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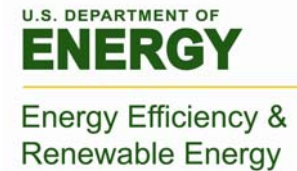
Zero Energy Homes



ZEH-100 Saves 100% of Traditional Household Energy Use

Ultimate goal is a Zero Energy Home using cost effective tools, techniques and integrated technologies, systems and designs for buildings that generate and use energy so efficiently that buildings are capable of generating as much energy as they consume on an annual basis at neutral cash flow.

The Building America program is a public/private partnership consisting of seven consortia and over 500 organizations.



Building America

- **Goal:** Cost-neutral Net-Zero Energy Homes (NZEH) by 2020 in all climates.
- Public/private partnership.
- Developed multiple technical tools: a climate-specific Best Practices Series for new homes, the HVAC Retrofit Best Practices Guide for contractors, and Training Pilots for remodelers.

The Commercial Building Integration program includes key elements of market engagement.



Activities

- *National Accounts*: Challenging building owners/developers to construct buildings to use 50% less energy than ASHRAE Standard 90.1-2004, and retrofit existing buildings for 30% energy savings.
- *Commercial Building Energy Alliances*:
 - **Retail Energy Alliance**: 32 members, 2.3 billion sq. ft., \$720 billion in revenue and 104,727 stores.
 - **Commercial Real Estate Energy Alliance**: (Office, shopping center, hospitality, medical office, GSA) 39 members, 5.3 billion sq. ft., \$650 billion in assets.
 - **Hospital Energy Alliance**: 21 members, 320 million sq. ft., 817 hospitals, 167,550 total beds.
 - **Launching 2009/2010**: State and Municipal Energy Alliance and Higher Education Energy Alliance

Building Design Package Research and Development Activities

- Advanced Energy Design Guides
- Building Decision Tools



Accelerating Market Transformation

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ENERGY STAR

- Criteria development (e.g., appliances, Solid State Lighting, future products)
- Existing homes (Home Performance with ENERGY STAR)
 - A DOE, EPA and HUD program to target energy efficiency in existing homes
- Retail partnerships (National Campaigns, whole home services, merchandising)



Targeted Markets

- EnergySmart Schools
- EnergySmart Hospitals

Solar Decathlon (October 8-16, 2009)

- MOU with Spain for Europe 2010

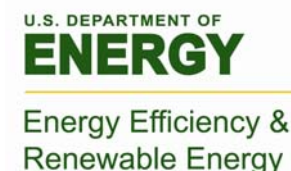
Building Codes

- 30% code improvement goals
 - Commercial model code - Std 90.1-2010
 - Residential model code - 2012 IECC
 - State code adoption & implementation - 2015



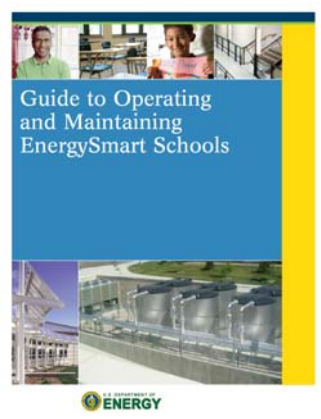
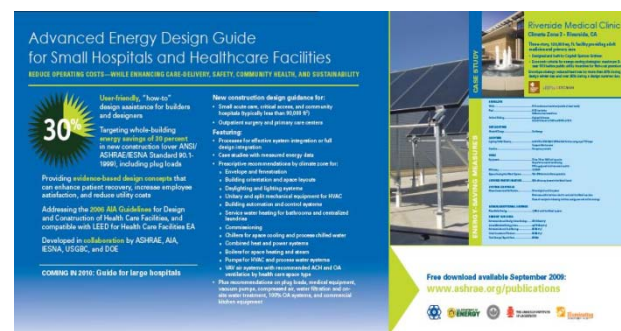
*The **DOE Solar Decathlon** university teams compete to design, build, and operate the most attractive and energy-efficient solar-powered house.*

Outreach Campaigns & Tools



EnergySmart Hospitals:

- Advanced Energy Design Guide for Small Hospitals & Healthcare Facilities
- “How-to” design assistance to achieve 30% energy savings in new construction. (Release: September 2009)



EnergySmart Schools:

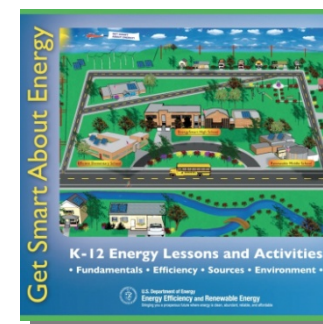
- Guide to Operating and Maintaining EnergySmart Schools
Helps facilities managers plan, make a business case for, and implement an energy focused O&M program. Provides technical guidance on low/no cost O&M solutions for major building components. (Release: August 2009)

EnergySmart Schools Solutions:

- A CD and website for all EnergySmart Schools publications, including the Guide to Financing EnergySmart Schools. (Release: September 2009)

Get Smart About Energy CD:

- A curriculum enhancement tool with energy-related lessons and activities. Aligned to National Education Standards and distributed through the ESS partner network.





ENERGY STAR Outreach Campaigns

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Recycle My Old Fridge launched in 2008 to get old, inefficient refrigerators off the grid and replaced with Energy Star models.



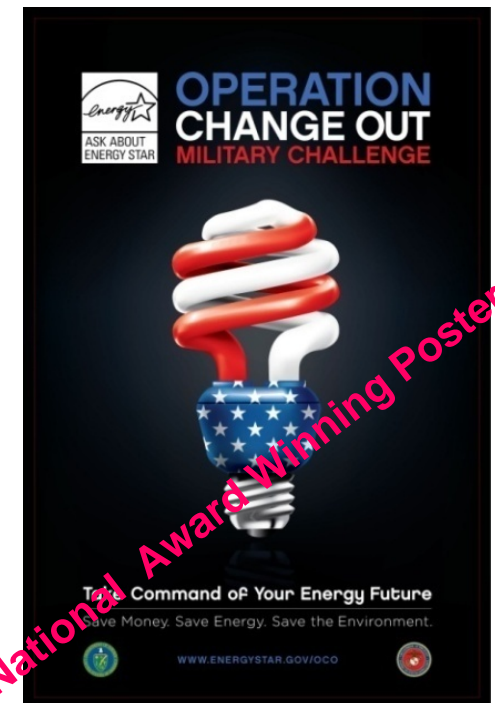
Recycle My Old Washer effort encourages consumers to replace energy and water-inefficient clothes washers with Energy Star-qualified washers.



Education campaign about the [Energy Star](#) rebates established by the American Recovery and Reinvestment Act of 2009.

Annual Energy Star Stakeholder Meetings

- Lighting Partner Meeting
- Appliance Partner Meeting



Joint DOE-DOD Military Challenge to save energy in base housing. 152 of 220 bases have pledged. ENERGYSTAR.gov/oco

Lock in Transformation with Building Energy Codes

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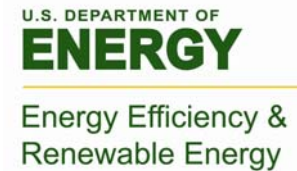
Lock in Technological Advances

- Upgrade model codes
 - 30% Improved building codes
- Provide financial and technical assistance to States to adopt, implement & enforce model codes
 - Code compliance tools
 - Advanced design guides
 - Online educational resources
 - Energy Codes 2009



Provides off ramp for market transformation

Appliance Standards Primary Activities

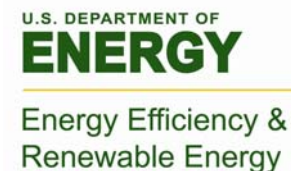


- **Minimum Energy Efficiency Standards**
 - Framework Document & Meeting
 - Preliminary Analysis Document & Meeting
 - NOPR Document & Meeting
 - Final Rule Document
- **Determinations**
- **Test Procedures**

- Prior to EPACT 2005, DOE completed standards for **11** products
- Since EPACT 2005, DOE completed standards for **9** products
- By 2011, DOE must complete standards for **23** products

Almost all Final Rule activities have statutory deadlines. Backlogged rulemakings due prior to EPACT 2005 also are under consent decree court ordered deadlines.

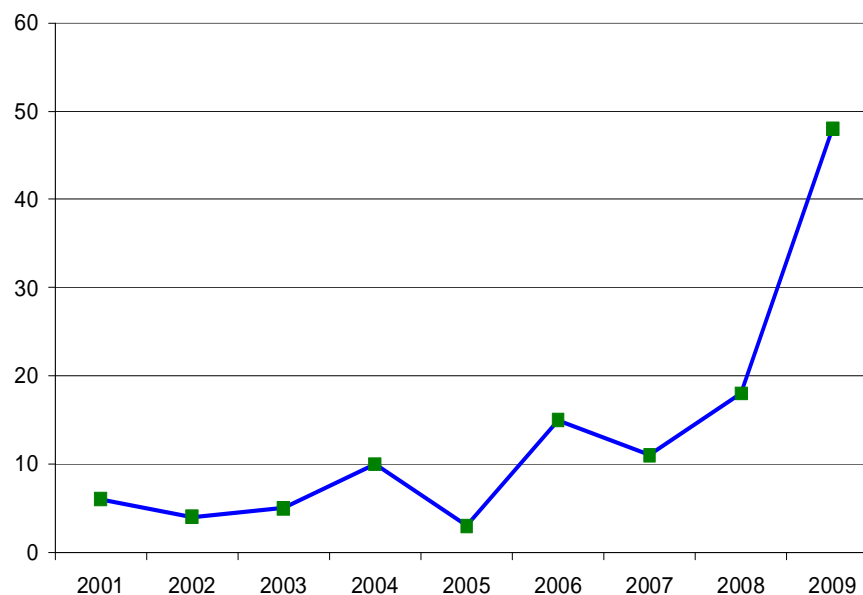
Appliance Standards



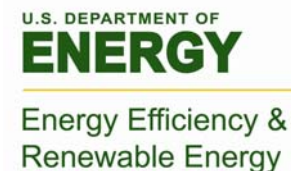
Energy Conservation Standards to be Completed by 2011

- Clothes Washers, Commercial
- Microwave Ovens
- Refrigerated Bottle or Canned Beverage Vending Machines
- Incandescent Reflector Lamps
- General Service Fluorescent Lamps
- External Power Supplies, non-Class A (Determination)
- Small Electric Motors
- Water Heaters, Residential
- Direct Heating Equipment
- Pool Heaters
- High-Intensity Discharge Lamps (Determination)
- Refrigerators, Residential
- Fluorescent Lamp Ballasts
- Room Air Conditioners
- Clothes Dryers
- Central Air Conditioners and Heat Pumps
- Battery Chargers
- External Power Supplies, Class A
- Residential Clothes Washers
- Metal Halide Lamp Fixtures
- Residential Furnaces
- Small Furnaces
- Mobile Home Furnaces
- Residential Boilers

Federal Register Publications by Calendar Year



Contact Information



Scott Hine, *Acting Program Manager*
Building Technologies Program
Office of Energy Efficiency and Renewable Energy
Department of Energy

Email: Scott.Hine@ee.doe.gov

Phone: 202-586-9744

buildings.energy.gov